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A STUDY ON THE EFFECT OF PROBIOTIC CURD SUPPLEMENTATION ON HIV (PLWH) UNDERGOING ANTI-RETROVIRAL THERAPY (ART)

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ABSTRACT

Background: Human Immunodeficiency Virus (HIV) infection results in gastro-intestinal damage, microbial translocation and immune activation which are associated with decreasing CD4 cell count and persistent abdominal distress. According to some research studies, probiotic food supplementation has been demonstrated to have promising results in improving the immune status i.e. CD4 cell profile in HIV subjects. **Methods:** In present study, about 100 patients (Males and Females) with an age range of 20-50 years, were identified for HIV Anti Retroviral Treatment(ART) and supplemented with indigenously prepared Probiotic curd (Indian dahi). The probiotic curd contained the blend of *Lactobacillus bulgaricus, Streptococcus thermophilus and Bifidobacterium bifidum*) daily for three months (3) along with their regular diet (noon meals). Their height, weight and Body Mass Index (BMI), Mid Upper Arm Circumference (MUAC) and Skin folds were recorded both at the baseline and after three months (90 days) i.e. before and after supplementation. Simultaneously blood samples were collected for CD4 cell counts, serum Adenosine deaminase (ADA) and total cholesterol (TC) levels for analysis. These patients were taking regularly Anti retroviral therapy (ART) at Osmania General Hospital, Hyderabad. **Results:** It was observed that all the anthropometric parameters were found to be significally increased. Further, the results showed that there was

0.08 log increase in the CD4 cell counts with an average 5 point decrease in the supplementation HIV subjects under study. However, there was decrease in cholesterol levels which was significant at 5% level i.e. the mean values decreased from 185 to 158 mg/ml. Similarly decrease was observed in the ADA levels showing the reversion back from abnormal to normal in these subjects after supplementation. **Conclusion:** The present study showed that the Probiotic curd (Indian dahi) prepared indigenously for supplementation was found to be effective as there was an improvement in the anthropometric parameters along with an enhancement of CD4 cell counts and decrease in cholesterol and ADA and in these subjects. Therefore, these observations suggest that inclusion of probiotic curd in the daily diet of HIV patients can have enormous improvement in their nutritional status. However, there is a need to conduct further studies at a larger level on the supplementation of probiotic based food products suitable to HIV subjects.

INTRODUCTION

According to the estimates by WHO and UNAIDS, there were 36.7 million people suffering from HIV globally at the end of 2016 and in 2018, the prevalence was increased to 37.9 million people across the globe with HIV/AIDS. Of these, 37.9 million were adults and 1.7 million were children (<15 years old). During the same year, about 1.8 million people became newly infected, and 1 million died of HIV-related causes were reported. In 2019, about 38.0 million suffered with HIV. In 2019, 68% of adults and 53% of children living with HIV globally received lifelong antiretroviral therapy (ART). By June 2020, 26 million people were assessed for antiretroviral therapy, marking a 2.4% increase from an estimate of 25.4 million at the end of 2019. India is the third largest HIV epidemic in the world, with 2.1 million people living with HIV. As per the report on India HIV estimation 2017, the prevalence of HIV among the adults (15–49 years) was estimated at 0.22% (0.16% – 0.30%). In 2017, adult HIV prevalence was estimated to be at 0.25% (0.18- 0.34) among males and 0.19% (0.14-0.25) among Females. The adult HIV prevalence at national level was continued its steady decline from an estimated peak of 0.38% in 2001-03 through 0.34% in 2007, 0.28% in 2012 and 0.26% in 2015 to 0.22% in 2017.

MATERIALS AND METHODS

During the period of study, a total of about one hundred (100) HIV patients who were on ART were recruited from Osmania General Hospital, Hyderabad Telangana, India. The institute ethical committee (IEC) clearance was obtained before the commencement of the

study. The inclusion criteria for the enrollment of HIV-positive patients was those patients with CD4 counts >400 cells/mm^3 and exclusion criteria was that patients with known allergy or intolerance to the product, diarrheal history of current inflammatory diseases of the small or large intestine, any past or current systemic malignancy, previous or actual drug addiction, use of antibiotics or probiotics during the 3 weeks prior to the enrollment for the study. The eligible participants were interviewed using a structured questionnaire to collect information on demographics, medical history and drugs use etc. These treatment groups were divided into two categories i.e., The Group A and Group B. The group A was supplemented with probiotic curd (LB+ ST+ Bifido) of about 100g/day for 3 months along with their regular ART treatment. The group B was considered as non supplemented group and continued their ART treatment. All the subjects were subjected to all the measurements of anthropometric indices viz Height, weight, BMI, MUAC and skinfolds.

Blood samples were collected before and after supplementation for laboratory investigations which include CD4cell counts using flowcytometer, serum cholesterol and Adenosine deaminase activity using commercially available kits supplied by Biosystems. Since that this was a preliminary study only 2-3 important markers were studied.

RESULTS AND DISCUSSION

In this study, significant changes were observed in the anthropometric parameters such as increase in their body weights, BMI, waist, Hip, MUAC Trisceps, Bisceps and Skin folds indicating the improvement in overall health status of HIV/AIDS by altering the physiological mileau i.e., ability for better absorption of nutrients during supplementation of probiotics.

HIV potentially infects and destroys CD4+ cells and leads to a gradual decline in the number of these immune cells. A combination of probiotic microflora is known to have up regulated T- cell activation there by suppressing pro inflammatory immune response in those suffering from autoimmunity including inflammatory bowel disease. Therefore, use of probiotics in HIV-1/AIDS subjects would be a rationale in this study. All subjects in the present study had a median of CD4+ T cell count of 470.29±232.32 which tend to increase to 524.56 ±245.06 cell /µl. Our results were on par with the earlier reports of Stephanie L. Irvine, B and Ruben Hummelen in 2010. According to their studies, consumption of yogurt can increase the CD4 count among people living with HIV. It was calculated that there was an average increase of 0.08 in log CD4 count at two different time points.

The findings indicated that probiotics may have the ability to block receptorsthereby decrease the impact of viral load of HIV on these cells. The increase the CD4 T lymphocyte count in patients with HIV provide a direct evidence that *Lactobacillus sp* expresses the CD4 receptor and utilizes that to block HIV transmission in HIV positive subjects.

Recent studies have confirmed that ADA to be an important immunoenzyme biomarker which helps in diagnosis and prognosis of various diseases both NCD's and other infectious disease. In the present study it was observed that the ADA values were abnormally high i.e. 31.35± 18.16. Which declined to 26.21±10.60 indicating the immunomodulation effect of probiotic curd supplementation on these individuals. Our observation was in line with previous reports indicating that HIV infection alters serum ADA activity by T.Suboi and, Valls V et al.

Therefore, elevated plasma ADA activity might be considered as a useful surrogate marker for HIV infection that occurs early in the disease process. The body composition especially the weight increased in HIV patients because the Probiotic Dahi have the necessary micronutrients. It was observed that the mean difference in the serum cholesterol levels were decreased in these subjects which was significant at 5% level

i.e. decreased from 184.97±46.74 to 157.99± 48.21 among the total subjects under study (Table-1). The mean percentage of change for CD4 was 11.5% were as cholesterol decrease to 14.6% and ADA decrease to 16.4%,

Table 1: Effect of Probiotic supplementation on changes in various parameters in PLWH.

	supplementation				
	Before		After		
	Mean	SD	Mean	SD	
AGE	34.20	7.96	34.20	7.96	
HT	164.08	8.33	164.08	8.33	
WT	56.15	13.69	57.51	13.82	↑
BMI	20.69	4.16	21.22	4.28	↑
WAIST	73.91	10.79	76.81	12.54	↑
HIP	79.89	9.73	84.19	10.67	↑
MUAC	23.62	4.35	24.87	4.69	↑
TSF	11.44	3.72	12.72	4.69	↑
BSF	7.19	2.46	8.42	3.77	↑
SC	11.64	4.32	12.99	4.05	↑
SI	8.67	3.21	9.32	3.30	↑

CD4	470.29	232.32	524.56	245.06	↑
logcd4	2.59	0.33	2.67	0.22	↑
ADA	31.35	18.16	26.21	10.60	↓
CHOLESTEROL	184.97	46.74	157.99	48.21	↓

Mean of % change for CD4 – 11.5%, CHOL – 14.6% and ADA – 16.4%

CONCLUSION

Probiotic curd supplementation significantly improved the physiological status, immune system and thereby lowering CVD Risk factors. Therefore, intervention with probiotic formulation would improve the quality of life for those people living with HIV (PLWH).

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